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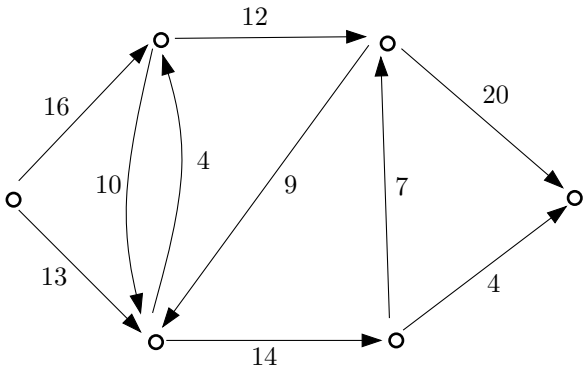
Graphs & Algorithms II — Exercise Set 6 — HS07

URL: http://www.ti.inf.ethz.ch/ew/courses/GA07/

Exercise 16



Apply the preflow-push algorithm to the above network.

Exercise 17

Show how to implement the preflow-push algorithm using $O(1)$ time per push operation and using a total of $O(nm)$ time for all relabel operations.

Exercise 18

In a sports league, a set T of $n \geq 2$ teams compete for some championship. They play a large number of matches against each other; each match is between two teams and one of them wins while the other looses. At the end of season, the team(s) with most wins are champions.

At some point during the season, the management of a team wants to tell whether there is any way that they can still win the championship.

Denote by $w(t)$, $t \in T$, the number of games team t has won so far. And for any pair $\{t_1, t_2\} \in \binom{T}{2}$, let $p(t_1, t_2)$ be the number of matches team t_1 and t_2 will still play against each other during the remainder of the season.

Based on this information, give a polynomial time algorithm to answer their question.

Homework 6

For a graph $G = (V, E)$, a vertex cover is a set $U \subseteq V$ of vertices such that for each edge $e \in E$ there is at least one endpoint in U, that is, $e \cap U \neq \emptyset$.

In general, the problem of finding a minimum size vertex cover is NP-hard. Give a polynomial time algorithm for bipartite graphs.

Homework due: 07.11.2007, 11:00AM.